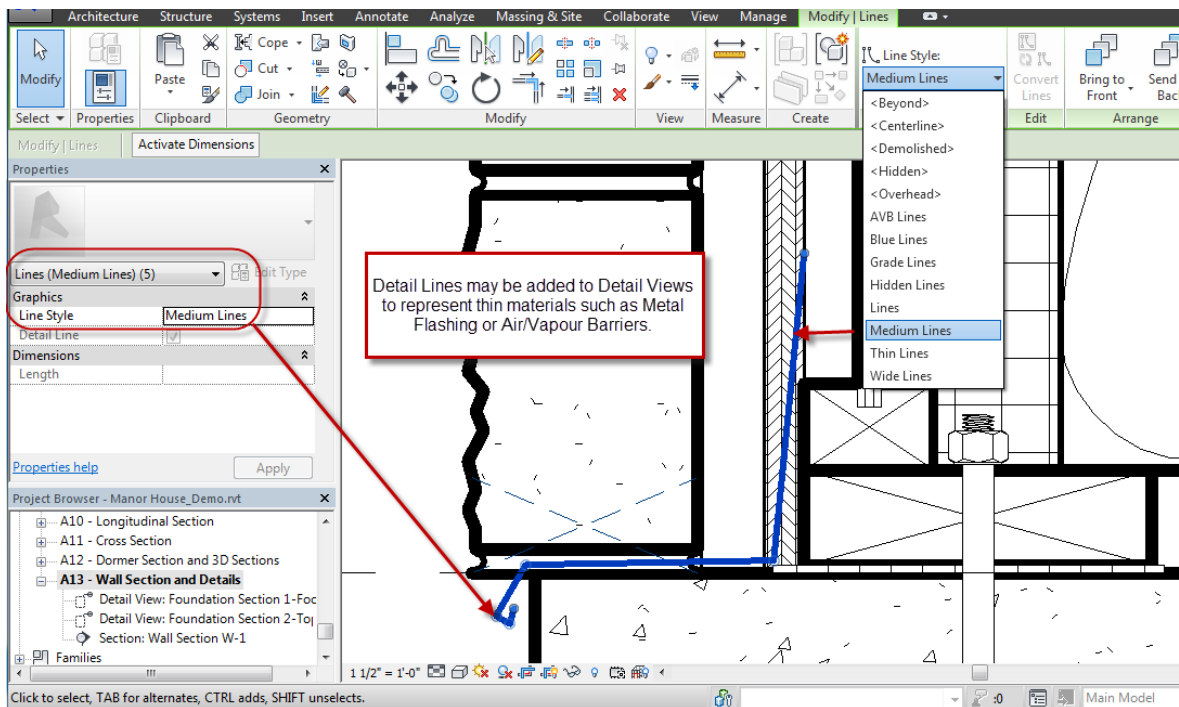


AGENDA:

1. Detailing II - Detail Lines and Insulation
2. Masking Regions and Fill Regions
3. Draw Order, Hidden Lines, and Cut Profile tools
4. Detail Groups

1. Detailing II – Detail Lines and Insulation

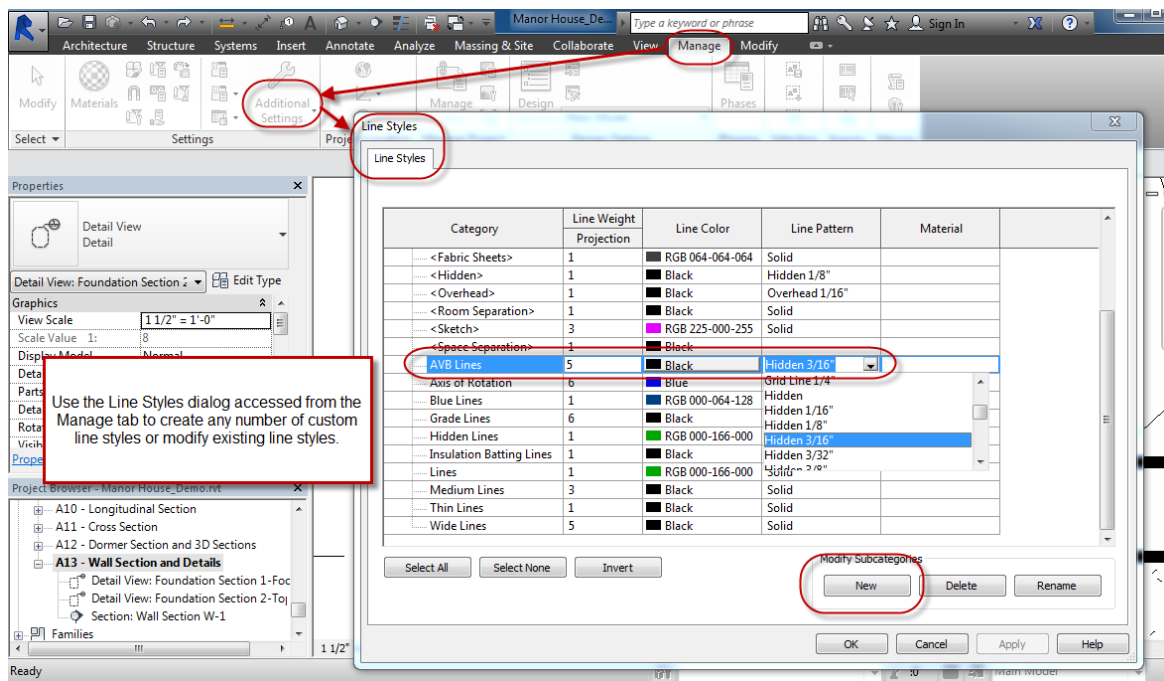
Detail lines may be used to represent thin materials in a detail that would not show a visible thickness. Metal flashing, Polyethylene sheeting, Bituminous or Elastomeric coatings are all examples of materials which may be shown in a detail view with a line or series of end-connected line segments.



Other uses for detail lines include the display of hidden features such as the weep holes which must be added at regular intervals along the bottom of a masonry cavity wall. The X-shaped hidden lines at the bottom of the stone veneer unit in the image above are representing these weep holes.

Detail Lines are added by picking the Detail Line tool on the Create panel of the Annotate tab or with the shortcut, DL. When you start the Detail Line tool, you select the desired line style from the Line Style pulldown and then use the typical set of draw tools to sketch the shape or edges you need.

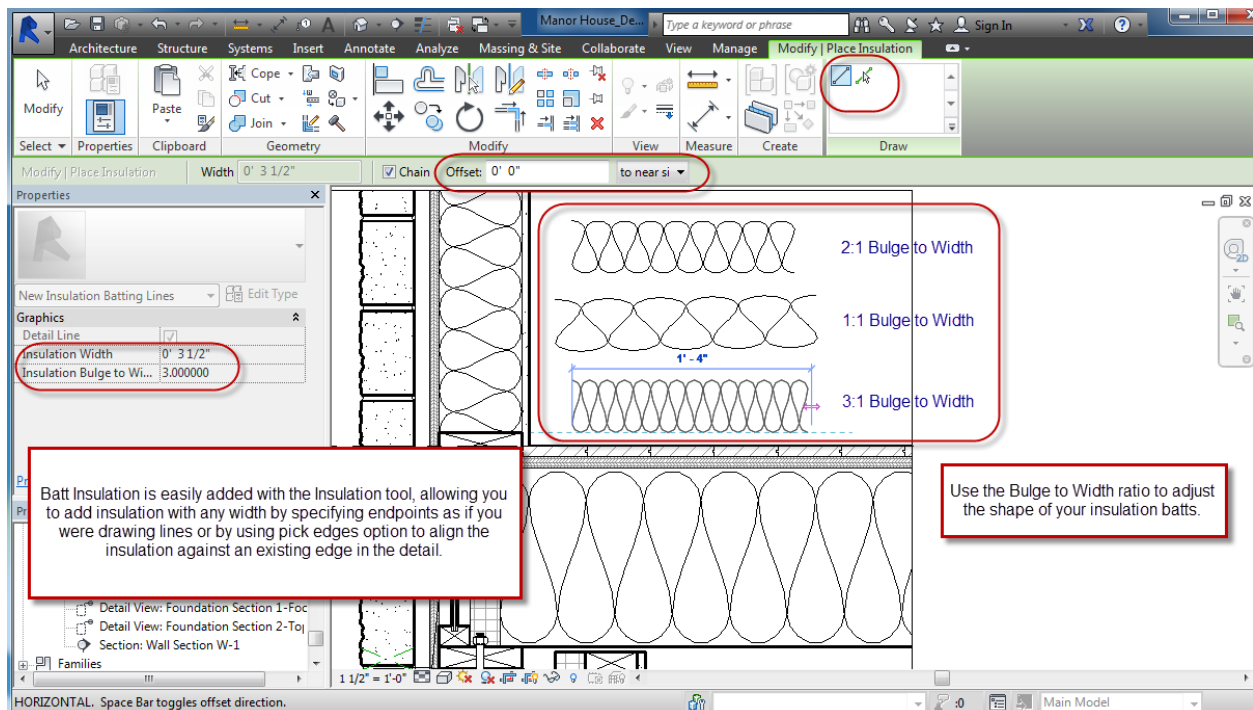
You can also use the Pick Edges option on the draw panel, along with the Offset value on the Options bar to create parallel or concentric edges next to existing detail lines or to model edges.



The Line Styles tool, found in Additional Settings pulldown on the Manage tab allows you to create any number of custom line styles. To create a new Line Style, just give it a name, specify a Line Weight, Line Color, and Line Pattern. (linetype)

In addition to using Detail Lines to add new edges to a Detail View, you can also use the LineWork tool (LW) from the View panel on the Modify tab to override the line style assigned to edges in the actual building model edges being displayed in your Detail View. If you wish to hide any of the model edges, you can use the <Invisible Lines> line style and then pick the edges you want to remove from the display. This would be useful for instance if you are showing individual courses of masonry in the detail view and do not want the continuous edge of the actual 3D masonry component to conceal the mortar profile.

The Insulation tool on the Detail panel of the Annotate tab allows you to draw Batt Insulation in your detail either by picking points to specify the endpoints of the insulation or by picking existing edges in the detail view. An alignment option will default to Center which works best for filling wall cavities with insulation. Alternatively, you can set this option to Near Side or Far Side which are convenient options for drawing insulation along an existing edge such as the underside of a floor or along a roof line. The offset value lets you further refine the position of the insulation being created.

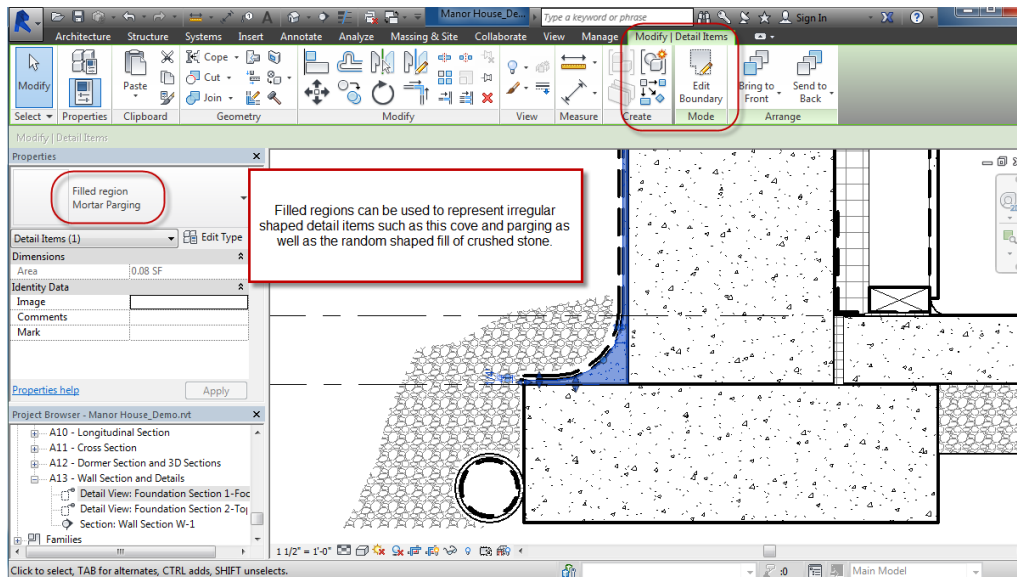


After starting the Insulation tool, you can set the width or depth of the insulation on the Options bar or in the Properties Palette. There is also an option in the Properties palette for setting the Insulation Bulge to Width ratio. The default value of 2:1 works well for wall insulation of 3 1/2" or 5 1/2" thickness. When drawing deeper batt depths such as 9" or even 12" batts, increasing the ratio to 3:1 will give a more traditional appearance.

Batt insulation can be easily modified after creation by dragging the control grips located at the endpoints of the insulation segment. Multiple batts parallel to each other can be created by copying or by using the offset tool.

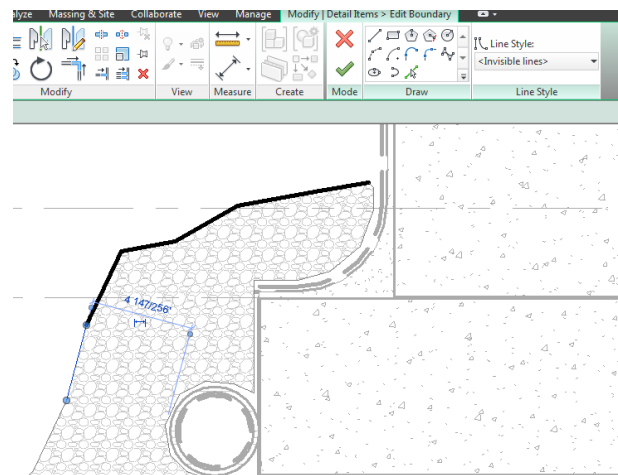
2. Filled Regions and Masking Regions

Filled Regions allow you to create an enclosed area filled with a graphic pattern such as concrete, earth, sand, or any other available fill pattern (hatch pattern). This will allow you to add detail items with an irregular shape such as a curved concrete cove extending from vertical section of concrete parging.



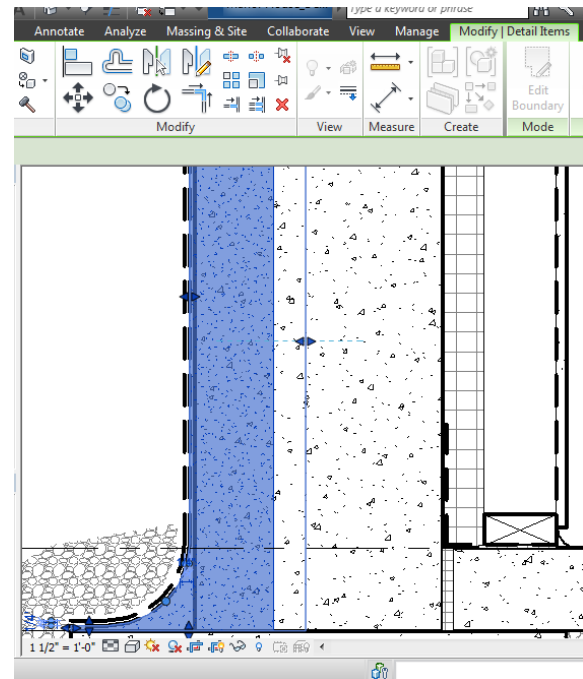
Filled Regions are created from the region flyout on the Detail panel of the Annotate tab. When you start the tool you enter sketch environment where you can use draw tools and pick edges to create an enclosed boundary. Select the desired fill pattern from the type pulldown or use Edit Type and Duplicate to create custom fill types using any loaded fill pattern.

The boundary edges for the filled region may be assigned any line style, including invisible edges such as show on the crushed stone region at the outside of the footing in the image above. Line styles may be assigned to the entire boundary or to individual edges as overrides. Pick the Region, and then Edit Boundary to access the line styles for selected edges.

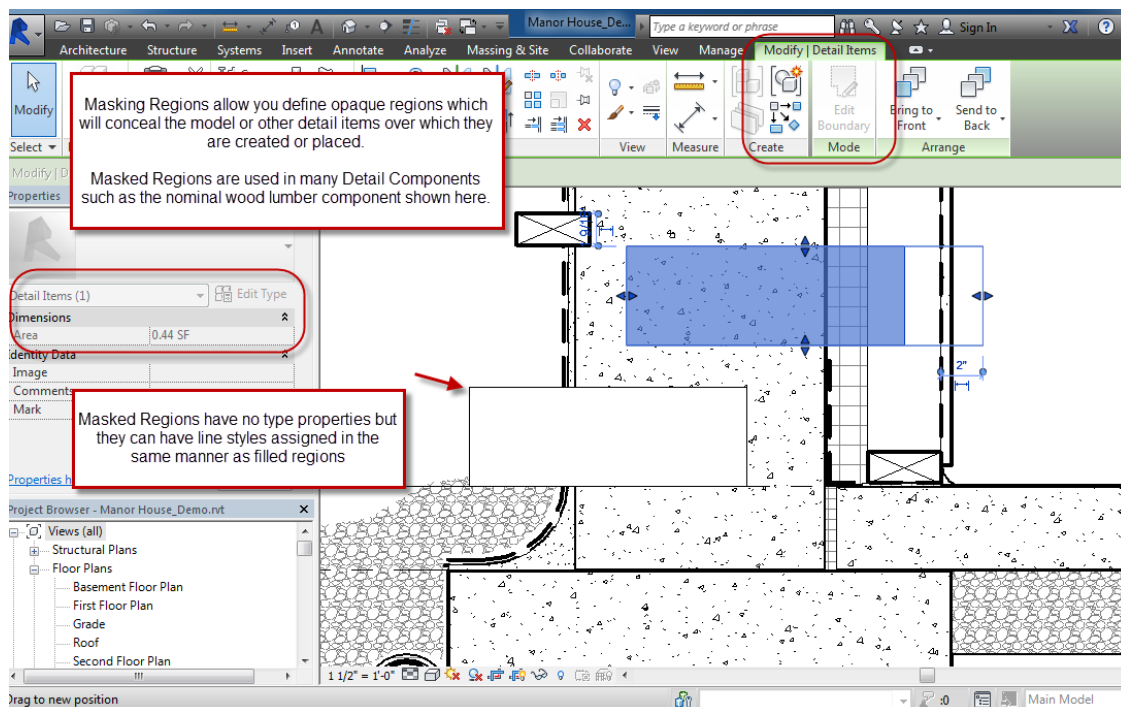


Filled Regions may be modified with control grips on their boundary edges as shown in the image at right. Dragging a region edge in line with another edge will enable a lock icon allowing you to constrain the filled region to the model.

Some fill patterns are not loaded in the default templates used to start Revit projects. The gravel pattern shown in this example, is added to the project by inserting the base course detail item which has that fill pattern nested in its family. Adding the detail item makes the new fill pattern available for any filled regions.



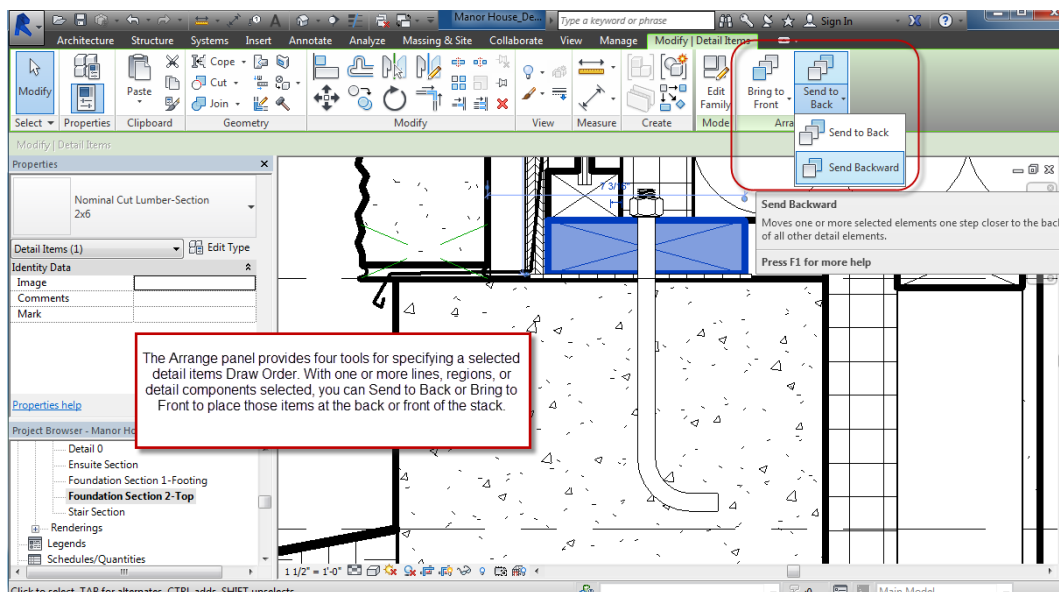
Masking Regions are similar to Filled Regions but instead of using a fill pattern they create an opaque area which can be used to conceal items below, either in the model itself or other detail components.



3. Draw Order, Cut Profile and Hidden Line Settings

Draw Order refers to how detail components can layer over top of each other on top of the model display in a detail view. You can think of detail components as being cut out of sheets of paper and then arranged one over the other on a table top. The detail components will always be on top of the table (the model) but if you have two components which overlap, one can be placed in front of the other.

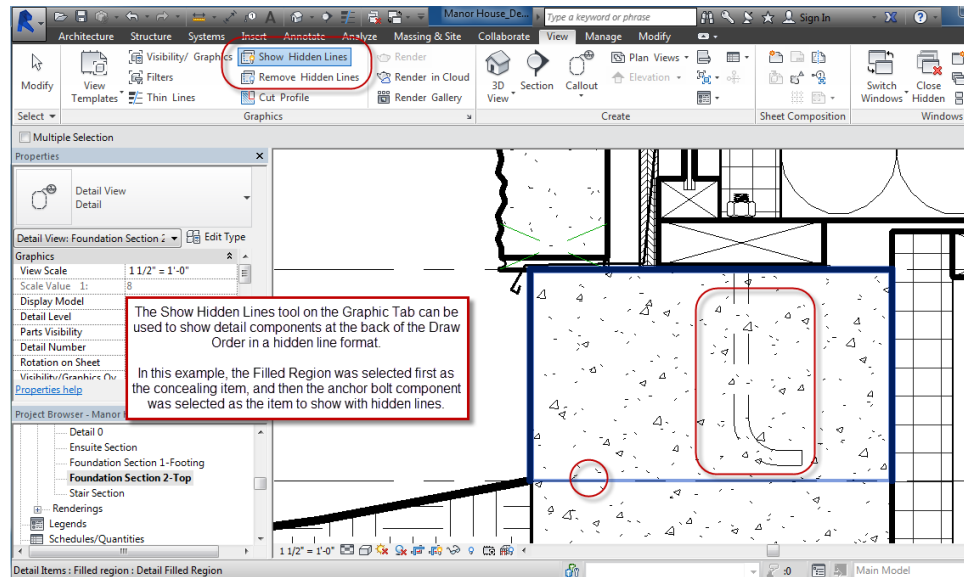
When one or more detail items are selected, an Arrange panel appears on the Modify tab of the ribbon. Bring to Front or Send to Back are used to shift an item to the top or bottom of the stack. Bring Forward and Send Backward allow you to shift a detail item back or forth one layer at a time.



In the image above, the anchor bolt detail component was added after the 2x6 component so it is layered in front of the wood as well as the rigid insulation. By selecting the 2x6 and using the Bring to Front tool, that portion of the anchor bolt will be concealed.

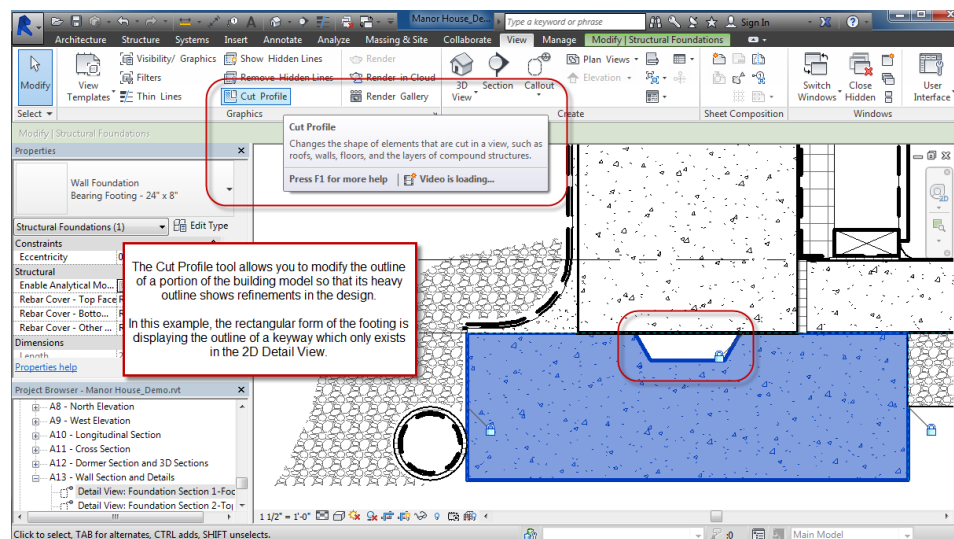
Note that because the foundation wall is the actual building model, and not just a filled region, it is impossible to move the bolt component behind the wall. The building model is always at the back and is not affected by the Arrange tools. To conceal the lower portion of the anchor bolt you could create a rectangular filled region with a concrete hatch pattern and move it in front of the bolt.

Hidden line settings on the Graphics panel of the View tab allow you further refine the display of detail items which overlap by using the Show Hidden Lines tool. This tool lets you pick a concealing item first, and then a second item further back in the draw order, to display with a hidden line style.



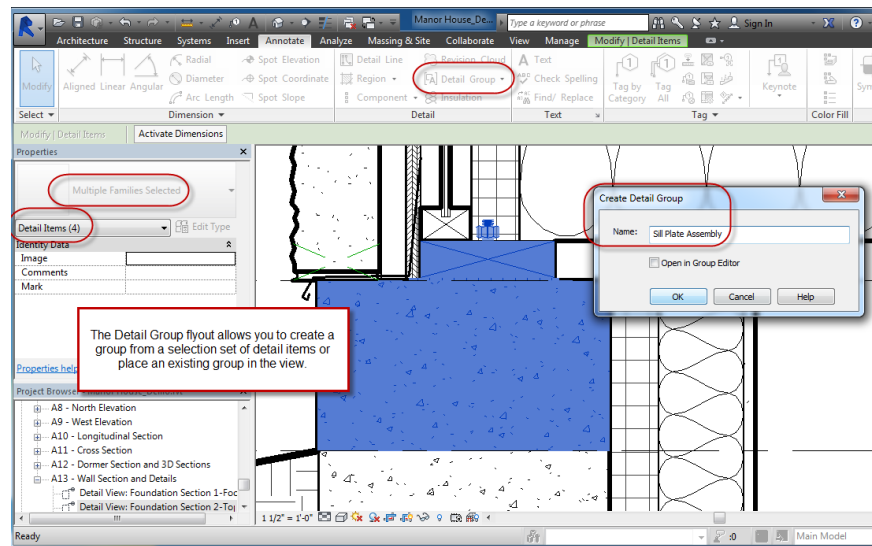
Remove Hidden lines may be used to reverse the effect of the Show Hidden lines tool.

The Cut Profile tool, allows you select a cut face from a building element and then enter a sketch mode in which you can modify the shape of the heavy outline at the perimeter of the face.

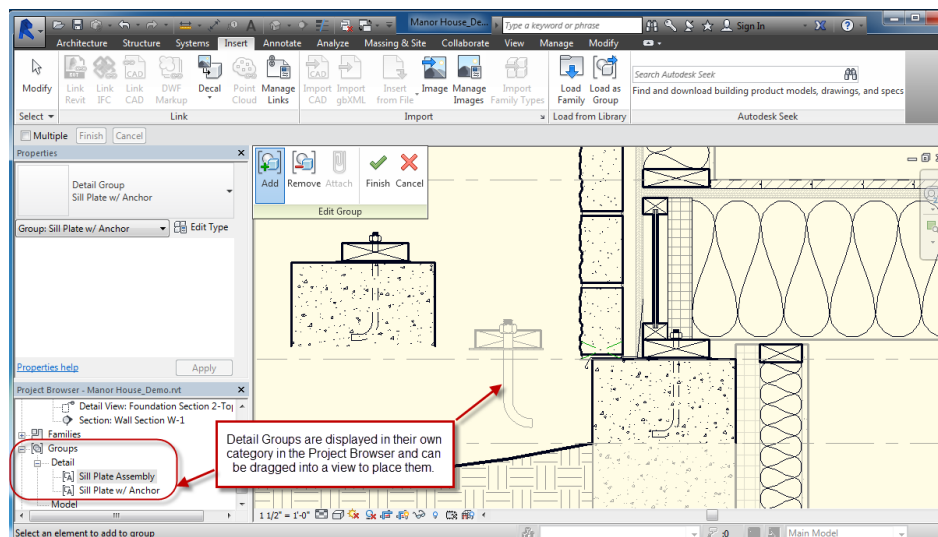


4. Detail Groups

The Detail Group flyout lets you Create a Group from a selection set of detail items, or place a group that has already been defined. Detail Groups are useful for common arrangements of detail elements that may be repeated on several details.



If you select an existing group, you adjust its origin or enter an edit group state during which you can add or remove items from the detail group. Detail Groups may be placed from the Project Browser.



Exercise Notes

In the following exercise you are going to continue developing your detail views with filled regions, more custom components, as you learn to work with Draw Order, Show Hidden lines, and Cut Profile tools.

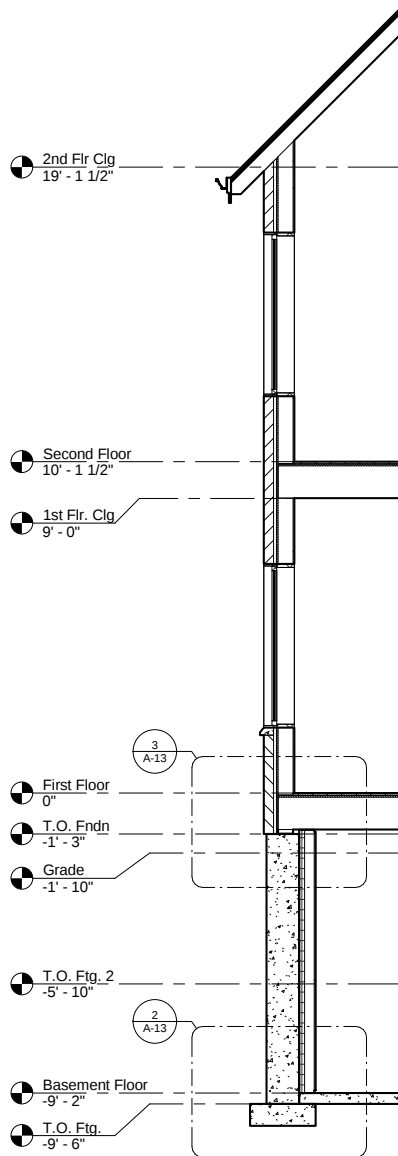
1. Open your Manor House project that we worked on in the previous class. Switch to the Foundation Section 2 – Top view on Sheet A13. Currently, the foundation exterior face is perfectly aligned with the face of the stone veneer component above. Brick or Stone veneer can corbel or overhang the face of the foundation by a maximum of 1 inch or 25mm. To create this overhang in our detail we will actually modify the position of the foundation wall and move it one inch towards the interior. This is another of those changes that will need to be done with the entire foundation but for our purposes in this exercise, we will just shift this one wall. Pick the foundation wall, select the Move tool and then shift the wall over 1 inch. If you get any warnings about needing to remove constraints, do so.
2. Depending on how of if you locked your detail components to the building model in the previous lesson, you may need to select these items and move them over 1 inch as well. On my attempt, all detail items as well as the interior foundation partition shifted over at the same time as the foundation wall.
3. Let's create a new Stone Veneer Unit family and then create a repeating detail component to show the courses in the stone layer of the wall. Choose Detail component and then Load Family. Browse to the Detail Items / Div 04-Masonry / and look in the Stone Assemblies folder. Nothing is appropriate. Go up one level and then open the folder for 042200-Concrete Unit Masonry. Choose the Split Face CMU-Section family and pick Open. In the type pulldown, choose Split Face CMU-Section 4"x8"x16" and an instance beside the wall in an open area.
4. This split face CMU component has the rough face we want to represent the stone, but the inner lines for the core are not required, the size is a bit off and the hatch pattern is wrong. It is also facing the wrong direction for our view. 😊 Pick the Unit and choose Edit Type. Duplicate to create a new type called 3.5"x 6" x 16". Turn off the core visibility, set the thickness to 3-1/2" and the height to 5-5/8". Pick OK. Looks close but the hatch is off and it needs a flip control.

5. Double click the component to open it in the family editor. Save the file with a new name inside the stone assemblies folder in Div 04-Masonry. Call it Stone Veneer Unit-Section.
6. Type VG to open the Graphics overrides dialog. Toggle the Annotation Categories on so you can review the framework of references and parameters controlling this family. Toggle them back off as the parameters should work fine as is.
7. Open the Family Types dialog and set the 3.5" x 6" x 16" type current. Turn off the core visibility parameter and pick Apply and OK. The smaller unit now appears but the outline of the core is still visible. Pick it and you will see that it is a masking region. Pick the Associate Family Parameter button in the Visible Parameter in the Properties palette. It is already linked to the core visibility parameter. Pick cancel.
8. Select the filled region Concrete Block and pick Edit type. Duplicate and create a new type called Stone Veneer. Change the Fill Pattern to Sand-Dense if you have it, or Gypsum-Plaster. Pick Ok.
9. Switch to the Create panel and choose the Control tool. Add a Double Horizontal control in the middle of the component. Pick Save and then Load Into Project. Hit Escape and then switch back to the top of foundation view on Sheet A13
10. Pick the CMU component you added earlier and in the type pulldown change it to the new Stone Veneer 3.5"x6"x16" component type. Try the flip control to change the direction of the face.
11. Pick Edit Type and turn on the Core Visibility to confirm it is still working. Adjust the Face parameter to 1" and Apply. Turn the Core visibility back off and delete the component.
12. Create a new Repeating Detail Component called Stone Veneer Unit-Section with your new stone detail component. Set the Spacing to 6" and pick OK. Pick a start point at the lower outside corner of the stone veneer on the building model display and use the space bar to flip the stone so the rough face is pointing out. Drag your cursor up and out of the view before picking an end point so the stone units extend to the top. Pick the repeating detail and drag it in until the back edge is aligned with the correct edge on the building model. Enable the lock icon which appears to constrain the component.

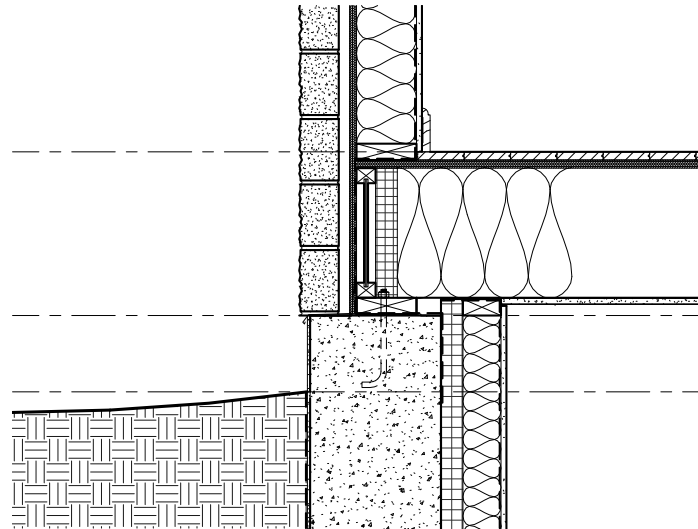
14. Zoom in around the front edge of one unit and turn on the Thin Line display. The underlying edge of the component from the building model is overlapping the rough outline of the stone face unit and obscuring it. From the View panel on the Modify tab, choose the Linework tool and select the Invisible lines line style. Pick the front edge of stone veneer on the building model to make it invisible. Turn the Thin Line toggle off and zoom back out. Much better. 😊
15. Pick the heavy edge which still appears at the grade line. This is the Site topography element. Hide this category in the current view.
16. From the Region flyout, choose Filled Region and then pick Edit Type. Duplicate and create a new type called Mortar Parging and set the fill pattern to Sand-Dense. Start a rectangle at the upper left corner of the foundation wall and drag a rectangle down until it extends out of the view. Set the width of the rectangle to ¼". Set the boundary edges to use a Medium Lines line style.
17. Create a new Filled Region. Edit Type, Duplicate, and create a new filled region type called Earth hatch. Set the Fill Pattern to Earth. Set the line style to Grade Lines and add a shallow arc starting where the grade level line meets the foundation and then angling down a few inches to the left side of the view. Switch to Invisible Lines and add three more segments along the face of the mortar parging and the two borders of the view to create a closed shape. Finish the region.
18. Zoom in to where the earth meets the foundation. Pick the mortar parging and choose Send to Front to pull its edge in front of the earth filled region and get a better read on the line weight.
19. From the Manage tab, go to Additional Settings and pick Line Styles. Create a new line style called AVB lines with a line weight of 5 and a line pattern of Hidden 3/16". Choose the Line tool and set the offset to 1/8" on the Options bar. Draw a line that traces the front edge of the parging but is offset 1/8" in front of it so it reads better than if it was stacked.
20. Add another series of lines to represent the air vapour barrier on the inside of the drywall on both interior finished walls. Wrap the AVB lines below the sill plates and around the floor header assembly as shown on the sample detail.
21. Use the Detail line tool again with a line style of medium lines to add a sill flashing with drip edge at the bottom course of stone veneer and extending 6 -8 inches up behind the wall sheathing.

22. Select the Anchor Bolt component and choose Send to Back on the Arrange panel. From the Graphics panel on the view tab, pick Show Hidden Lines. Pick the Sill Plate as the concealing object and then pick the Anchor Bolt to assign the Hidden line display. The lower portion of the anchor bolt should also be shown in hidden lines. Add a rectangular filled region with a concrete hatch fill and invisible edges on the sides and bottom edge. The top edge should use a Wide Line. After finishing the region, use the Show Hidden lines tool and pick the Region as the concealing object and then the anchor bolt again.
23. A minor thing about the anchor bolt that has been bugging me for a bit is the direction of the hook. I would prefer it be pointing toward the middle of the foundation wall instead of the thin edge. Pick the anchor bolt and choose Edit Family. From the Create tab, add a Control to allow it to flip horizontally and then Load the family back into the project. Flip the direction of the hook.
24. From the Annotate panel, pick the Insulation tool. Set the width to 3 ½" and pick a start point at the lower midpoint of the top plate in the interior foundation partition wall. Drag down and pick a point outside the view to fill the wall cavity with batt insulation. Add a 5 ½" batt to the cavity in the first floor wall. Add a 12 inch batt to the floor space starting at the rigid insulation next to the header and extending in about 2 feet to the interior.
25. Since we are showing the optional interior finish on the foundation partition, we should add it to the ceiling as well as this would be applied before the vertical walls. Add a detail component for a 5/8" Gypsum Wallboard Section family along the underside of the floor system and extending above the drywall finish for the interior wall.
26. Switch to the footing detail. Add a filled region for the ¼" thick Mortar parging offset from the foundation wall and footing. Add a 4 inch radius arc to the outer edge at the inside corner where the foundation wall meets the footing. The edges against the concrete should use Wide lines and the outer edges should use Medium lines.
27. Add an AVB Detail Line offset 1/8" from the outer edge of parging including the curved cove at the bottom. Add another set of AVB lines at the inside of the drywall layer, wrapping down along the frame wall, below the plate and then terminating about 6 inches up the foundation wall. With the same line style, add a small arc at the corner below the drywall, from the plate to the slab.

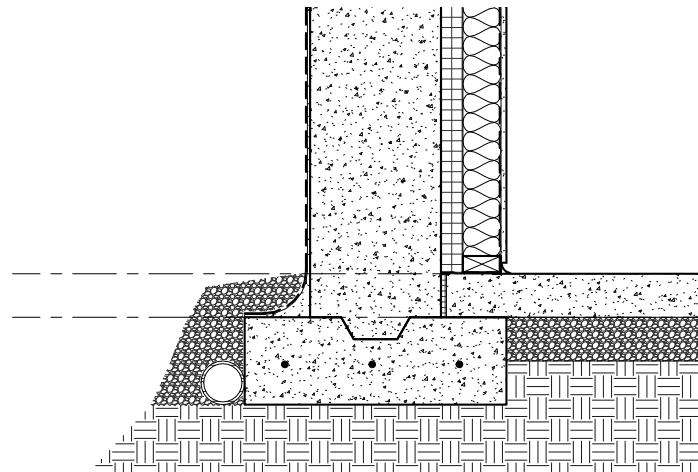
28. Create a new filled region type for crushed stone/gravel using the gravel fill pattern added with our base course component. Sketch a closed region starting above the top of slab level and extending down around to the foot of footing to cover the weeping tile drainage pipe. Use Invisible edges for the entire boundary. Use short line segments to rough out the curves.
29. Add the 3 ½" batt insulation to the frame wall.
30. Add three 5/8" diameter reinforcing bar section families in the footing. Although this is a metal, you will find the family in the Div 03-Concrete / 032100-Reinforcing Steel.
31. Zoom in to the top of the footing. Go to the View tab, pick the Cut Profile tool, and then select the footing outline to enter a sketch mode. Draw a keyway along the top edge of the footing. Start at the midpoint, go down 2 inches, out 2 inches to one side, and then up at a 60 degree angle. Mirror and delete the middle vertical segment to finish.
32. Float your cursor over the small arrow control on the bottom edge of the sketch. This controls which side of the profile you will keep and which part will be removed. Make sure it is pointing to the large area of the footing and finish the sketch. Float your cursor over the outline of the footing so it is highlighted to see how it wraps around the keyway.
33. Float your cursor over the keyway outline and then pick to select the cut profile. Move it 2 inches to one side. Delete it. Now hit CTRL-Z twice to get it back to the correct position.
34. To show the foundation wall fill pattern extending smoothly down into the footing keyway, use the Cut Profile tool again on the foundation wall. Trace the three edges of the keyway, make sure the arrow is pointing up towards the foundation wall, and finish the sketch. 😊
35. To finish the detail, add a final filled region showing an earth pattern below the footing and other lower elements. Use Invisible edges.
36. The Details are looking good and are ready for annotations such as dimensions, keynotes, and/or text notes.
37. That will complete the detailing portion of the assignment. Save and close your file. 😊



① Wall Section W1
3/8" = 1'-0"



③ Foundation Wall Section 2
1 1/2" = 1'-0"



② Foundation Wall Section 1
1 1/2" = 1'-0"

Green Inc.
Manor House
Wall Section and
Details

Project number	2014_3-3
Date	Oct. 31, 2014
Drawn by	KB
Checked by	KB

A-13

Scale	As indicated
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